UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 23, 2013

LICENSEE: Tennessee Valley Authority

FACILITY: Sequoyah Nuclear Plant, Units 1 and 2

SUBJECT: SUMMARY OF TELEPHONE CONFERENCE CALL HELD ON AUGUST 19, 2013, BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND TENNESSEE VALLEY AUTHORITY, CONCERNING REQUESTS FOR ADDITIONAL INFORMATION PERTAINING TO THE SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC. NOS. MF0481 AND MF0482)

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Tennessee Valley Authority held a telephone conference call on August 19, 2013, to discuss and clarify the staff's requests for additional information (RAIs) concerning the Sequoyah Nuclear Plant, Units 1 and 2, license renewal application. The telephone conference call was useful in clarifying the intent of the staff's RAIs.

Enclosure 1 provides a listing of the participants and Enclosure 2 contains a listing of the RAIs discussed with the applicant, including a brief description on the status of the items.

The applicant had an opportunity to comment on this summary.

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Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosures:
1. List of Participants
2. List of Requests for Additional Information

cc w/encls: Listserv

TELEPHONE CONFERENCE CALL
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION

LIST OF PARTICIPANTS
AUGUST 19, 2013

PARTICIPANTS	**AFFILIATIONS**
Richard Plasse	U.S. Nuclear Regulatory Commission (NRC)
Emmanuel Sayoc	NRC
James Medoff	NRC
Duke Nguyen	NRC
Ata Istar	NRC
Alice Erickson	NRC
Bart Fu	NRC
Henry Lee	Tennessee Valley Authority (TVA)
Dennis Lundy	TVA
Andrew Taylor	TVA
Alan Cox	Entergy/Enercon
Stan Bach	Entergy/Enercon

ENCLOSURE 1

REQUESTS FOR ADDITIONAL INFORMATION DISCUSSED
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
AUGUST 19, 2013

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Tennessee Valley Authority held a telephone conference call on August 19, 2013, to discuss and clarify the following requests for additional information (RAIs) concerning the license renewal application (LRA).

The Sequoyah Nuclear Plant, Units 1 and 2 (SQN), RAIs of set 11 (ML13224A126), were discussed and a mutually agreeable date for the response of RAIs 4.1-8a, 4.6-1, B.1.40-4a, and B.1.17-1a was set within 60 days from the date of the letter on August 22, 2013. For the rest of the enclosed RAIs a mutually agreeable date for the response was set within 30 days from the date of the letter.

RAI 4.1-4a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-4, Parts a. and b. on whether the flaw analysis for the reactor coolant pump (RCP) casings at Sequoyah Units 1 and 2 would need to be identified as a Time Limited Aging Analysis (TLAA) for the License Renewal Application (LRA) in accordance with 10 CFR 54.21(c)(1) TLAA identification requirements.

Issue:

To resolve the RAI request, the applicant must demonstrate that the analysis does not conform to one or more of the six definition criteria that are used to define a plant analysis as a TLAA, as given in 10 CFR 54.3(a). In its response to RAI 4.1-4, Parts a. and b., the applicant relies on a future licensing basis change that the applicant claims will be done during the Period of Extended Operation (PEO) and uses this future licensing basis change in the PEO as the sole basis for concluding that the supporting flaw tolerance analysis for the RCP casings does not need to be identified as a TLAA. This is not acceptable because the basis did not demonstrate why the stated analysis is not in conformance with all six definition criteria for TLAAs in 10 CFR 54.3(a) or why the analysis would not need to be identified pursuant to the TLAA identification requirement in 10 CFR 54.12(c)(1) and the six criteria for TLAAs in 10 CFR 54.3(a).

Request:

1. Clarify whether ASME Code Case N-481 and the supporting flaw tolerance evaluation for the RCP casings are ~~currently~~ being relied upon in the CLB as the basis for performing alternative visual examinations of the RCP casing welds, and if so, justify why the flaw tolerance analysis would not need to be identified as a TLAA for the LRA, as based on the CLB for the Sequoyah units at time of the LRA review. Respond to Part -2 of this request if this Code Case is still being relied upon for the CLB.

ENCLOSURE 2

Clarify how the flaw tolerance evaluation addressed potential drops in the fracture toughness property of the CASS RCP casing material during the ~~period of~~ extended ~~operation~~PEO, and justify why the assessment of loss of fracture toughness in the evaluation would not need to be within the scope of a TLAA for the LRA.

RAI 4.1-6a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-6, Part a., on whether the flaw for the boric acid injection tank (BIT) at Unit 2 would need to be identified as a TLAA for the LRA in accordance with 10 CFR 54.21(c)(1) TLAA identification requirements.

Issue:

The staff has determined that the applicant's response demonstrates that the flaw evaluation for the Unit 2 BIT does not need to be identified as a TLAA because the analysis: (a) does not involve time-dependent assumptions defined by the current operating term, and (b) does not conform to the definition of a TLAA in 10 CFR 54.3(a). However, the staff noted that the applicant does not identify cracking as an aging effect requiring management for the BIT in LRA Table 3.3.2-10, and does not specifically credit augmented inspections under the applicant's In-service Inspection (ISI) Program (LRA AMP B.1.16) to manage cracking that was detected in the Unit 2 BIT.

Request:

Identify the mechanism that initiated the flaw in the BIT bottom head-to-shell weld and identify whether this mechanism was age-related. In addition, clarify whether the flaw in the BIT bottom -head-to-shell weld could grow by an age-related growth mechanism, such as cyclical loading or one of the stress corrosion cracking mechanisms, regardless of the cause for initiation of the flaw in the BIT bottom head-to-lower shell weld. Justify why cracking (including crack growth) has not been ~~appropriately~~ listed in LRA Table 3.3.2-10 as an ~~applicable~~ aging effect requiring management for welds in the BIT and why the applicant's ~~Inservice Inspection~~ISI Program (LRA AMP B.1.17) has not been credited to manage cracking in the BITs.

RAI 4.1-8a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-8, Parts 1 and 2, on whether the UFSAR Section 10.2.3 includes any plant turbine analyses that would need to be identified as TLAAs in accordance with requirements for identifying TLAAs in 10 CFR 54.21(c)(1). The staff has determined that the applicant's response to RAI 4.1-8, Part 1 provides adequate demonstration that the probabilistic analyses for the high pressure turbines (HPTs) and low pressure turbines (LPTs) do not need to be identified as TLAAs for the LRA.

Issue 1:

The applicant stated in its response to RAI 4.1-8, Part 2 that evaluation of stress corrosion cracking (SCC) in Westinghouse Report WSTG-1-NP (i.e., Reference 3 in the RAI response) is not a TLAA because it does not involve time-limited assumptions. However, SCC is identified in GALL Table IX.F as time-dependent aging mechanism, which implies that the analysis of SCC involves a time-limited assumption, unless demonstrated to the contrary.
In contrast, the response to the RAI did not provide any reason why the analysis does not involve a time-limited assumption and therefore does not adequately demonstrate that the evaluation of SCC in the referenced Westinghouse analysis would not need to be identified as a TLAA for the LRA.

Request 1:

Explain how the analysis of SCC was performed in Westinghouse Technical Report No. WSTG-1-NP (i.e., Ref. 3 in the response to RAI 4.1-8). Based on this explanation, clarify why the analysis of SCC in the report is not considered to involve time-limited assumptions. Based on your response, provide your basis (i.e., justify) why the analysis of SCC in the referenced Westinghouse report does not need to be identified as a TLAA, when compared to the six criteria for defining an analysis as a TLAA in 10 CFR 54.3(a).

Issue 2:

The applicant stated in its response to RAI 4.1-8, Part 2 that "no fatigue-based analysis was required or used in the turbine missile evaluation." However, UFSAR Section 10.2.3 (i.e. UFSAR page 10.2-9) makes the following statement:

> Prior to 1980, the Westinghouse missile probabilities and energies analyses were directed primarily at missile generation due to destructive overspeed. Fatigue of the rotating elements due to speed cycling was also considered as a missile generation mechanism in these earlier analyses. These earlier Westinghouse analyses indicated that the probabilities of missile generation due to fatigue and destructive overspeed were very low in comparison to the probability estimated by Bush. The Bush probability (1 x 100-4 missile producing disintegrations per turbine operating year) was chosen for the original Sequoyah missile hazard evaluation in order to provide a very liberal margin of safety.

Based on this UFSAR statement, it appears that the Westinghouse fatigue analyses of the LPT rotating elements were used to confirm the missile generation probabilities of the Bush studies (as referenced in the UFSAR and response to RAI 4.1-8, Part 1) that were used for the LPTs. It is not evident why these Westinghouse analyses would not need to be identified as TLAAs for the LRA.

Request 2:

1. Identify the Westinghouse fatigue analyses that were referenced on UFSAR page 10.2-9 and performed in analysis of the LPT rotating elements.
2. Explain how the assessment of fatigue was performed in these analyses.
3. Provide your basis (i.e., justify) why the stated Westinghouse fatigue analyses of the LPT rotating elements would not need to be identified as TLAAs for the LRA, when compared to the six criteria for defining an analysis as a TLAA in 10 CFR 54.3(a).

RAI 4.1-11a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-11, which provided the applicant's basis on why the exemption for use of ASME Code Case N-514 as the basis for establishing the temperature enable settings for the low temperature overpressure protection (LTOP) system does not need to be identified as an exemption for the LRA in accordance with the requirements in 10 CFR 54.21(c)(2). In its response, the applicant stated that ASME Code Case N-514 has been incorporated into ASME Section XI, Appendix G, and therefore, this exemption will not be required when the pressure-temperature limits are updated for the ~~period of extended operation~~PEO. The applicant stated that an LRA amendment is not needed with respect to identifying this exemption as an exemption that meets the requirements in 10 CFR 54.21(c)(2).

Issue:

The staff does not find the applicant's response to RAI 4.1-11 to be acceptable because 10 CFR 54.21(c)(2) requires regulatory exemptions to be identified in the LRA based on the CLB as it exists at the time of the NRC's LRA review, and not on future actions that may or may not be implemented during the period of extended operation. The regulation requires the applicant to identify any regulatory exemption that was previously granted under the requirements of 10 CFR 50.12 and whose basis for the exemption was based on a ~~time-limited aging analysis~~TLAA. For each exemption that does need to be identified for the LRA, the rule requires the applicant to provide an evaluation in the LRA that justifies the continuation of the exemption during the period of extended operation.

The Pressure Temperature Limits Report (PTLR) and WCAP-15293 for Unit 1 and PTLR and WCAP-15321 for Unit 2 refer to ASME Code Case N-514 in relationship to establishing the enable temperature for the LTOP system in each unit. However, the CLB for each unit still contains an exemption to use ASME Code Case N-514 for the pressure lift setpoints and enable temperatures of the plant LTOP systems. As such, the exemption to use Code Case N-514 may be based on a TLAA since the exemption allows the applicant to establish these setpoints based on a mathematical function of the limiting adjusted reference temperature (RT_{NDT} value) for the reactor vessel beltline materials. Therefore, the staff needs further justification why the exemption for use of ASME Code Case N-514 had not been identified as an exemption that meets the exemption identification criteria in 10 CFR 54.21(c)(2) and why this exemption has

not been included in the LRA and dispositioned in accordance with the exemption requirements in 10 CFR 54.21(c)(2).
~~The current Pressure-Temperature Limits Report (PTLR) for Unit 1 and PTLR for Unit 2 both list ASME Code Case N-514 as the current methodology basis in the CLB for establishing the enable temperature setpoint for the LTOP system in each unit, even though the applicant does have the option of amending its licensing basis during period of extended operation to eliminate the need for application of ASME Code Case N-514. This exemption may be an exemption that is based on a TLAA since the enable temperature is based relative to a comparison to the limiting adjusted reference temperature (RT_{NDT} value) for the reactor vessel beltline materials. Therefore, the staff needs further justification why the exemption for use of ASME Code Case N-514 had not been identified as an exemption that meets the exemption identification criteria in 10 CFR 54.21(c)(2) and why this exemption has not been included in the LRA and dispositioned in accordance with the exemption requirements in 10 CFR 54.21(c)(2).~~

Request:

1. Clarify whether the exemption for use of ASME Code Case N-514 had been granted in accordance with the requirements in 10 CFR 50.12.
2. Clarify whether the alternative bases in ASME Code Case N-514 were based on a TLAA and justify your bases for concluding that either the stated exemption is either based on a TLAA or is not based on a TLAA.
3. ~~Clarify whether the use of ASME Code Case N-514 is currently referenced in Sequoyah Report No. PTLR-1 as the basis in the CLB for establishing the LTOP system enable temperature setpoint for Unit 1 and in Sequoyah Report No. PTLR-2 as the basis in the CLB for establishing the LTOP system enable temperature setpoint for Unit 2.~~
4. Based on your responses to Parts a., b. ~~and c~~1 and 2 of this RAI, justify why the exemption to use ASME Code Case N-514 for Units 1 and 2 would not need to be identified as an exemption for the LRA that meets the exemption identification requirements in 10 CFR 54.21(c)(2).

RAI 4.6-1 - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

Per SRP-LR Section 4.6.1.1.1 for a TLAA to be dispositioned in accordance with 10 CFR 54.21(c)(1)(i), the existing analyses must be verified to be valid and bounding for the period of extended operation. SRP-LR Section 4.6.3.1.1 states that the existing analyses should be shown to be bounding even during the ~~period of extended operation~~PEO.

LRA section 4.6 states "Analyses were identified for bellows assemblies for the penetrations that stated they were qualified for 7000 cycles of the design displacements. The number of design displacements expected to occur from either thermal changes or containment pressurizations is much less than 7000. Therefore, the associated penetrations bellows are qualified for the PEO. The analysis remains valid for the PEO in accordance with 10 CFR 54.21(c)(1)(i)."

Issues:

The staff reviewed the SQN UFSAR and was not able to find and verify the analyses used to estimate the number of displacements for bellows assemblies of the penetrations expected to occur from thermal changes or containment pressurizations and project those analyses to the end of the PEO.

Requests:

To ensure "the estimated number of cycles" are within "the qualifying limit of 7000 cycles," describe how the qualifying limit of 7000 cycles was determined, and provide the estimated number of cycles due to cyclic loading conditions (e.g.: thermal, pressure, etc.) for the containment penetration bellows at the end of PEO.
~~Explain and justify how the existing analyses used in the LRA to estimate the number of displacements for bellows assemblies of the penetrations expected to occur include those for thermal changes or containment pressurizations. and provide information on the basis for stating that the analyses remain valid to the end of the PEO.~~

RAI B.1.40-1a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

Based on its audit of the applicant's program basis document for the Structures Monitoring Program, it is not clear that the preventive actions for storage, lubricants, and corrosion potential discussed in Section 2 of the ~~Research Council for Structural Connections (~~RCSC~~)~~ publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts," will be used consistent with the recommendations in the GALL Report.

Issue:

The applicant's response to RAI B.1.40-1 dated July 1, 2013 states that the Structures Monitoring Program employs the preventive actions for storage, lubricants, and corrosion potential. The program basis document stated that the preventive actions of Section 2 of Research Council for Structural Connections publication "Specification for Structural Joint Using ASTM A325 and A490 bolts" have been considered in existing plant procedures for ASTM A325 and A490 bolting. However, during its audit, the staff found that the existing procedures provided as part of the program basis document for the Structures Monitoring Program did not include the preventive actions for storage, lubricants and corrosion potential. The staff has not been provided with sufficient information to verify that the preventive actions program element of the Structures Monitoring Program is consistent with the GALL Report, without enhancement or exception, as claimed by the applicant in the LRA.

Request:

1. Describe the preventive actions for storage, lubricants, and corrosion potential employed by the Structures Monitoring Program.
2. If the procedures describing these preventive actions were not referenced~~provided~~ in the program basis document when audited, provide clarification and make revisions to the LRA and UFSAR supplement as necessary.

RAI B.1.40-4a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

Based on the response dated July 1, 2013, the technical evaluation of the groundwater in-leakage concluded that 1) the condition would not affect the intended function of the structure elements, and 2) the technical evaluation of the crack concluded that the structural capability of the turbine building north wall was not unacceptably impaired and that the wall would continue to perform its design function.
The response stated that minor groundwater in-leakage has been observed and documented in several Category I~~I~~ structures since 1996. Inspections of the turbine building (as listed in the LRA), a non-Category I structure, noted in-leakage in the basement floor slab at elevation 662.5' and significant in-leakage for the north and south perimeter walls above floor elevation 662.5' and floor elevation 685'. The response also stated that the turbine building is the most significant of the structures within the scope of the Structures Monitoring Program due to the constant moisture in-leakage over large areas of the structure. Although leak repairs have been initiated, the staff observed conditions during the audit walkdowns that may need further evaluation to demonstrate that the effects of aging will be adequately managed during the period of extended operation. The staff is concerned that the continued constant exposure to groundwater in-leakage may affect the integrity of the reinforced concrete during the period of extended operation.

Issue:

1. The technical basis, supporting the evaluation that concluded the groundwater in-leakage into the turbine building would not affect the intended function of the structure, was not provided.
2. The technical basis, supporting the evaluation that concluded the structural capacity of the turbine building north wall was not unacceptably impaired, was not provided.
3. Considering the history of constant groundwater in-leakage, in the absence of a plan to further evaluate the condition of the below-grade concrete, the staff is concerned that the periodic visual inspections, performed under the proposed Structures Monitoring Program, may not provide sufficient information, regarding the integrity of the concrete and reinforcing steel, for monitoring and trending of the structure during the period of extended operation.

Request:

1. Provide additional information regarding the technical evaluation that was performed, which concluded the groundwater in-leakage would not affect the intended function of the turbine building. Include the following details in the response:

    a. Completion d~~D~~ate ~~in~~ for which the technical evaluation ~~was performed~~ and if/when it was re-evaluated
    b. Description of activities performed (e.g. visual inspection, testing, structural analyses, chemical analyses)
    c. Description of the qualitative or quantitative acceptance criteria used
    d. Discussion of results obtained supporting the conclusion reached
    e. Corrective actions taken, if any
    f. Structural drawing(s) detailing the below grade-concrete in the area considered to have the most significant in-leakage, indicating floor elevations, water table elevation, concrete wall and floor slab thickness, rebar details. Indicate on the drawing the approximate locations of groundwater in-leakage.

2. Provide additional information regarding the technical evaluation of the large diagonal crack on the north wall of the turbine building, which concluded that the structural capacity of the turbine building north wall was not unacceptably impaired. Include the following details in the response:

    a. Width of the crack at its widest point
    b. History of crack growth
    c. Discussion about the source of rust colored stains on the wall and flowing out of the crack
    d. Description of activities performed (e.g. visual inspection, testing, structural analyses, chemical analyses)
    e. Discussion of results obtained supporting the conclusion reached
    f. Corrective actions taken, if any
    g. Sketch detailing the location and dimensions of the crack, and areas of spalling.

3. In the absence of a plan to mitigate the groundwater in-leakage, explain how the proposed Structures Monitoring Program will adequately manage the potential increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide; cracking due to expansion from reaction with aggregates; and cracking, loss of bond, and loss of material due to corrosion of embedded steel. Include any plans for testing and/or inspections that may demonstrate the effects of aging will be adequately managed during the period of extended operation.

RAI 3.1.2-4-1a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 29, 2013, the applicant responded to RAI 3.1.2-4-1, and stated that reduction of heat transfer is not an aging effect requiring management for steam generator tubes.

Issue:

The staff considers reduction of heat transfer in steam generator tubes to be an applicable aging effect requiring management. The staff notes that heat transfer is the intended function for the steam generator tubes, and without proper management, the intended function could be compromised ~~"EPRI Steam Generator Integrity Assessment Guidelines" provides guidance on maintenance for steam generator components, including secondary side cleaning. Section 10.4 of the EPRI guidelines describes the guidance on preventing "heat transfer limitation," to manage reduction of heat transfer for steam generator tubes. The applicant's Steam Generator Integrity Program, in part, includes secondary side maintenance activities, such as sludge lancing, for removing deposits that may contribute to aging-related degradation. The applicant's program should implement the EPRI guidelines in accordance with NEI 97-06, consistent with the GALL Report.~~

Request:

Discuss how reduction of heat transfer will be managed for steam generator tubes. Revise the LRA as necessary, consistent with the response.

RAI B.1.25-1a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

In a letter dated May 31, 2013 the staff issued RAI B.1.25-1 requesting additional information ~~that demonstrates~~ on the corrective~~proactive~~ actions taken to prevent in-scope inaccessible power cable exposure to significant moisture including- manhole, sump pump, and cable support structure inspection and, maintenance~~. and corrective actions~~. The staff also requested the applicant to include a summary discussion of the complete schedule for inaccessible cable corrective actions ~~and their schedule for completion~~. The staff further requested the applicant describe inaccessible power cable testing (e.g., test frequency, and ~~test~~ applicable~~ility~~ tests) performed that demonstrates that in-scope inaccessible power cables will continue to perform their intended function consistent with the current licensing basis (CLB)~~before and during the period of extended operation (PEO)~~.

In response to the staff's RAI, in a letter dated July 1, 2013, the applicant stated that as documented in the SQN corrective action program, there have been multiple instances of water in manholes at SQN. In 2012, a report was initiated in the correction action program to document the trend of high levels of water in manholes that the work control process is not resolving in a timely manner. In response to the identified issues with untimely removal of water from manholes, the preventive maintenance (PM) task instructions were revised to require water removal, if found, from the manholes before the PM task could be closed.

SQN experience since revising the PM instruction has been that the water, if any, has been removed within a week of initiating the PM activity. The applicant also stated that as a result of operating experience (OE) with water in the manholes, a team of TVA personnel was established in early 2013 to resolve the dewatering issues with safety-related manholes. The team is scheduling activities which will repair or replace sump pumps and discharge piping as necessary to improve dewatering performance. In addition, TVA stated it is issuing a modification to enhance the ability to remove water from manholes without having to remove the heavy missile shield manhole covers. The applicant further stated that a cable support structure inspection is performed at least once every five years as part of the SQN structures monitoring~~surveillance~~ ~~maintenance~~ program (SMP). Finally, the applicant stated ~~and~~ that the inspections described in NUREG-1801, Section XI.E3 will be implemented as part of the new SQN Non-EQ Inaccessible Power Cables (400 V to 35 kV) Program described in LRA Section B.1.25 prior to entering the PEO. During the PEO, the periodic inspections of manholes including cable support structures will be completed at least once every year (annually).

Issue:

The applicant's ~~PM~~ program for inaccessible cables may allow unacceptable water levels to remain in the manhole for an extended period~~up to a week~~ before corrective action to remove the water is completed. The staff noted that because of the difficulty in removal of the ~~heavy~~ manhole covers, there ~~was~~ has been limited manhole inspection and ~~preventive~~ maintenance of the sump pumps to ensure sump pumps were operable and capable of preventing cable submergence. In addition, based on OE with water in manholes, the staff is concerned that the current five year inspection frequency for manhole structures including cable supports may not be adequate.
The applicant's RAI response did not ~~provide~~ describe~~what~~ the corrective actions to be ~~that will be~~ taken ~~to ensure~~for manhole inspection and maintenance ~~the operation~~ of sump pumps to prevent exposure of cables to significant moisture~~unacceptable water levels~~. The staff is concerned that the applicant's manhole inspections and corrective actions may not be adequate to prevent in-scope inaccessible power cables fro~~o~~m being subjected to significant moisture. The staff could not determine based on current OE if the applicant's non-EQ Inaccessible Power Cable aging management program will ensure that in-scope inaccessible power cables will continue to perform their intended function ~~be effective~~ during the period of ~~extended operation~~PEO.

Request:

~~1. Describe how the inspection frequency for water collection and manhole support structures are established and adjusted for plant specific and industry operating experience.~~

1. Describe ~~what~~corrective -actions (e.g., inspection, preventive maintenance) and inspections. ~~including frequency, that~~ have ~~will~~ been taken to ensure the operation of sump pumps to prevent exposure of in-scope inaccessible power cables to significant

moisture~~unacceptable water level~~~~significant moisture~~. Include a discussion of the completion schedule to implement the corrective actions.

2. Provide a technical justification for the current 5 year inspection frequency for in-scope manhole cable support structures given plant specific OE with water in the manholes and GALL Report AMP XI.E3 guidance. Include a discussion on how the interval for water collection and inspection of manhole structures including cable supports is established and adjusted for plant specific and industry operating experience.

2.

~~3. Describe preventive maintenance activities that have been taken or will be taken to ensure that sump pumps are operable to prevent cable submergence.~~

~~4. Provide a technical justification for the current five year inspection frequency interval for in-scope manholes and cable support structures given the plant- specific OE with water in the manholes.~~

3. For in-scope inaccessible power cables subjected to submergence (significant moisture), how is the condition and operability of these cables determined? Describe the tests and inspections performed as part of the corrective action to ensure that these cables remain capable of performing their intended function consistent with the current licensing basis~~during the PEO~~.

~~XI.E3 The purpose of the aging management program (AMP) described herein is to provide reasonable assurance that the intended functions of inaccessible or underground power cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are exposed to wetting or submergence are maintained consistent with the current licensing basis through the period of extended operation.~~

RAI B.1.17-1a (Follow up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

In its response of RAI B.1.17-1 on July 1, 2013, the applicant stated "The configuration of the strainer allows leak off water to flow down the strainer and onto the ERCW strainer support causing corrosion. Planned corrective actions include a design modification of the strainer to prevent ERCW support from being continuously exposed to water, thus mitigating corrosion. The modification proposed to install a "catch container" to the ERCW strainer to route the leak off water coming out of the top of the strainer to a floor drain." The LRA states "The program was developed in accordance with ASME Section XI, 2001 Edition through the 2003 Addenda as approved by 10 CFR 50.55a." Accordingly the ERCW strainer support components should satisfy the requirements Article IWF-3000, "Standards for Examination Evaluations," which may include examinations, corrective measures, evaluations, tests, etc., currently and during the period of extended operation. GALL Report AMP XI.S3, in program element "acceptance criteria," refers to the acceptance standards of IWF-3400, and states "other unacceptable conditions include [l]oss of material due to corrosion or wear, which reduces the load bearing capacity of the component support."

Issue:In summary, the applicant will be implementing a corrective action of redirecting the leaking water on the ERCW strainer support components to a floor drain, thus mitigating corrosion. It is not clear how the corrosion process will be mitigated by restricting the leaking water on the ERCW strainer support components only, and is expected to perform its intended function during the period of extended operation.

Changing the degrading environment to a benign environment may not alleviate the initiated corrosion process of carbon steel supports subject to stresses under operating conditions. The incubation-stage of corrosion process may have already been completed on some of the support components. Material-weakening stage (cracking) of the carbon steel supports and their components and attachment welds may already have been initiated with an eventual outcome of a reduced load bearing capacity of the component support. It is not clear whether the LRA AMP In-service Inspection – IWF (ISI-IWF) Program will follow the recommendation of the GALL Report AMP XI.S3, program element "acceptance criteria," which is based on the requirements of ASME Code Section XI, Article IWF-3400 during the period of extended operation.

Request:

Provide ~~what are~~ the results of thethe ~~acceptance criteria for service~~ evaluations of the ERCW strainer support components per the requirements of ASME Code Section XI, Article IWF-3000"Standards for Examination Evaluations."

RAI B.1.11-1a (Follow up) – the following RAI was added to the set and mutually agreed upon.

Background:

In its July 1, 2013, response to request for additional information (RAI) B.1.11-1, the applicant provided its clarification on whether specific transients listed in RAI B.1.1.11-1 will be monitored as part of the Fatigue Monitoring program. The applicant stated the cycle limits of (1) 2,000 cycles of "Step changes in letdown stream fluid temperature from 100°F to 560°F" and (2) 24,000 cycles of "Step changes in letdown stream temperature from 400°F to 560°F" for the Chemical and Volume Control System (CVCS) regenerative heat exchangers will not be monitored by the Fatigue Monitoring program.

The applicant also stated that the 15 cycles of design tensioning cycle limit for the reactor coolant pump (RCP) hydraulic studs and nuts will not be monitored in the Fatigue Monitoring program. LRA Section 4.3.1.6 states the Fatigue Monitoring Program will manage the effects of aging due to fatigue on the RCP in accordance with 10 CFR 54.21(c)(1)(iii). The staff noted that the "parameters monitored/inspected" program element of GALL Report AMP X.M1, "Fatigue Monitoring," states that the program monitors all plant design transients that cause cyclic strains, which are significant contributors to the fatigue usage factor.

Issue:

In its justification for the two transients for the CVCS regenerative heat exchangers, the applicant stated that the letdown fluid temperature normally remains stable for both units. The applicant further stated that a maximum of 90 cycles for each of the transients are expected through the period of extended operation. The staff is unclear on the how the applicant came to these conclusions. The applicant did not explain how it determined that the letdown fluid temperature normally remains stable or how it can confirm that the temperature during the transient will remain stable for the period of extended operation. The staff is unclear if the temperature stability is during normal operation or during the transient. Also, the applicant did not provide an explanation based on its plant configuration and operational history to support its calculation that 90 cycles is expected for each transient through the period of extended operation.

In its justification, the applicant stated that the RCPs are rarely disassembled such that tensioning the studs and nuts is necessary. The applicant stated that only one RCP has installed hydraulically tensioned studs in 2005, and the studs have not been disassembled since its installation. The applicant used this basis to state that the 15 cycles of design tensioning cycle limit for the RCP hydraulic studs and nuts will not need to be monitored. However, the staff is unclear how the Fatigue Monitoring Program, in accordance with 10 CFR 54.21(c)(1)(iii), will manage the effects of aging due to fatigue on the RCPs if this transient is not monitored.

Request:

1. Confirm whether the letdown fluid temperature normally remains stable during normal operation or during the aforementioned transients.
    a. If the temperature is stable during normal operation, justify how the temperature stability has any impact on fatigue usage accumulation during the transients – in lieu of a justification, monitor these transients as part of the Fatigue Monitoring program.

    b. If the temperature is stable during these transients,
        i. State the basis for the letdown fluid normally remaining stable during these transients at SQN Units 1 and 2.
        ii. Describe what measures will be taken to ensure letdown fluid temperature will remain stable during these transients throughout the period of extended operation.

2. Describe how a maximum of 90 cycles for each of the aforementioned transients was calculated and justify that the calculations are consistent with plant configuration and operational history.

3. Describe and justify the programmatic elements of the Fatigue Monitoring Program that will manage the effects of aging due to fatigue on the RCPs, in accordance with 10 CFR 54.21(c)(1)(iii), given that the 15 cycles of design tensioning cycle limit for the RCP hydraulic studs and nuts will not be monitored.

4. If the Fatigue Monitoring Program will not be used, justify how the effects of aging due to fatigue will be managed for the RCPs in accordance with 10 CFR 54.21(c)(1)(iii). Revise the LRA as necessary.

September 23, 2013

LICENSEE: Tennessee Valley Authority

FACILITY: Sequoyah Nuclear Plant, Units 1 and 2

SUBJECT: SUMMARY OF TELEPHONE CONFERENCE CALL HELD ON AUGUST 19, 2013, BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND TENNESSEE VALLEY AUTHORITY, CONCERNING REQUESTS FOR ADDITIONAL INFORMATION PERTAINING TO THE SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC. NOS. MF0481 AND MF0482)

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Tennessee Valley Authority held a telephone conference call on August 19, 2013, to discuss and clarify the staff's requests for additional information (RAIs) concerning the Sequoyah Nuclear Plant, Units 1 and 2, license renewal application. The telephone conference call was useful in clarifying the intent of the staff's RAIs.

Enclosure 1 provides a listing of the participants and Enclosure 2 contains a listing of the RAIs discussed with the applicant, including a brief description on the status of the items.

The applicant had an opportunity to comment on this summary.

/RA/

Richard A. Plasse, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328
Enclosures:
1. List of Participants
2. List of Requests for Additional Information

cc w/encls: Listserv

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SUBJECT: SUMMARY OF TELEPHONE CONFERENCE CALL HELD ON AUGUST 19, 2013, BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND TENNESSEE VALLEY AUTHORITY, CONCERNING REQUESTS FOR ADDITIONAL INFORMATION PERTAINING TO THE SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC. NOS. MF0481 AND MF0482)

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 23, 2013

LICENSEE: Tennessee Valley Authority

FACILITY: Sequoyah Nuclear Plant, Units 1 and 2

SUBJECT: SUMMARY OF TELEPHONE CONFERENCE CALL HELD ON AUGUST 19, 2013, BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND TENNESSEE VALLEY AUTHORITY, CONCERNING REQUESTS FOR ADDITIONAL INFORMATION PERTAINING TO THE SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (TAC. NOS. MF0481 AND MF0482)

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The applicant had an opportunity to comment on this summary.

Richard A. Plasse, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

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September 23, 2013

LICENSEE: Tennessee Valley Authority

FACILITY: Sequoyah Nuclear Plant, Units 1 and 2

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Enclosure 1 provides a listing of the participants and Enclosure 2 contains a listing of the RAIs discussed with the applicant, including a brief description on the status of the items.

The applicant had an opportunity to comment on this summary.

/RA/

Richard A. Plasse, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

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NAME	I King	E Sayoc	R Plasse	Y Diaz-Sanabria
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TELEPHONE CONFERENCE CALL
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION

LIST OF PARTICIPANTS
AUGUST 19, 2013

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Richard Plasse	U.S. Nuclear Regulatory Commission (NRC)
Emmanuel Sayoc	NRC
James Medoff	NRC
Duke Nguyen	NRC
Ata Istar	NRC
Alice Erickson	NRC
Bart Fu	NRC
Henry Lee	Tennessee Valley Authority (TVA)
Dennis Lundy	TVA
Andrew Taylor	TVA
Alan Cox	Entergy/Enercon
Stan Bach	Entergy/Enercon

REQUESTS FOR ADDITIONAL INFORMATION DISCUSSED
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
AUGUST 19, 2013

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Tennessee Valley Authority held a telephone conference call on August 19, 2013, to discuss and clarify the following requests for additional information (RAIs) concerning the license renewal application (LRA).

The Sequoyah Nuclear Plant, Units 1 and 2 (SQN), RAIs of set 11 (ML13224A126), were discussed and a mutually agreeable date for the response of RAIs 4.1-8a, 4.6-1, B.1.40-4a, and B.1.17-1a was set within 60 days from the date of the letter on August 22, 2013. For the rest of the enclosed RAIs a mutually agreeable date for the response was set within 30 days from the date of the letter.

RAI 4.1-4a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-4, Parts a. and b. on whether the flaw analysis for the reactor coolant pump (RCP) casings at Sequoyah Units 1 and 2 would need to be identified as a Time Limited Aging Analysis (TLAA) for the License Renewal Application (LRA) in accordance with 10 CFR 54.21(c)(1) TLAA identification requirements.

Issue:

To resolve the RAI request, the applicant must demonstrate that the analysis does not conform to one or more of the six definition criteria that are used to define a plant analysis as a TLAA, as given in 10 CFR 54.3(a). In its response to RAI 4.1-4, Parts a. and b., the applicant relies on a future licensing basis change that the applicant claims will be done during the Period of Extended Operation (PEO) and uses this future licensing basis change in the PEO as the sole basis for concluding that the supporting flaw tolerance analysis for the RCP casings does not need to be identified as a TLAA. This is not acceptable because the basis did not demonstrate why the stated analysis is not in conformance with all six definition criteria for TLAAs in 10 CFR 54.3(a) or why the analysis would not need to be identified pursuant to the TLAA identification requirement in 10 CFR 54.12(c)(1) and the six criteria for TLAAs in 10 CFR 54.3(a).

Request:

1. Clarify whether ASME Code Case N-481 and the supporting flaw tolerance evaluation for the RCP casings are ~~currently~~ being relied upon in the CLB as the basis for performing alternative visual examinations of the RCP casing welds, and if so, justify why the flaw tolerance analysis would not need to be identified as a TLAA for the LRA, as based on the CLB for the Sequoyah units at time of the LRA review. Respond to Part -2 of this request if this Code Case is still being relied upon for the CLB.

Clarify how the flaw tolerance evaluation addressed potential drops in the fracture toughness property of the CASS RCP casing material during the ~~period of extended operation~~PEO, and justify why the assessment of loss of fracture toughness in the evaluation would not need to be within the scope of a TLAA for the LRA.

RAI 4.1-6a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-6, Part a., on whether the flaw for the boric acid injection tank (BIT) at Unit 2 would need to be identified as a TLAA for the LRA in accordance with 10 CFR 54.21(c)(1) TLAA identification requirements.

Issue:

The staff has determined that the applicant's response demonstrates that the flaw evaluation for the Unit 2 BIT does not need to be identified as a TLAA because the analysis: (a) does not involve time-dependent assumptions defined by the current operating term, and (b) does not conform to the definition of a TLAA in 10 CFR 54.3(a). However, the staff noted that the applicant does not identify cracking as an aging effect requiring management for the BIT in LRA Table 3.3.2-10, and does not specifically credit augmented inspections under the applicant's In-service Inspection (ISI) Program (LRA AMP B.1.16) to manage cracking that was detected in the Unit 2 BIT.

Request:

Identify the mechanism that initiated the flaw in the BIT bottom head-to-shell weld and identify whether this mechanism was age-related. In addition, clarify whether the flaw in the BIT bottom -head-to-shell weld could grow by an age-related growth mechanism, such as cyclical loading or one of the stress corrosion cracking mechanisms, regardless of the cause for initiation of the flaw in the BIT bottom head-to-lower shell weld. Justify why cracking (including crack growth) has not been ~~appropriately~~ listed in LRA Table 3.3.2-10 as an ~~applicable~~ aging effect requiring management for welds in the BIT and why the applicant's ~~Inservice Inspection~~ISI Program (LRA AMP B.1.17) has not been credited to manage cracking in the BITs.

RAI 4.1-8a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-8, Parts 1 and 2, on whether the UFSAR Section 10.2.3 includes any plant turbine analyses that would need to be identified as TLAAs in accordance with requirements for identifying TLAAs in 10 CFR 54.21(c)(1). The staff has determined that the applicant's response to RAI 4.1-8, Part 1 provides adequate demonstration that the probabilistic analyses for the high pressure turbines (HPTs) and low pressure turbines (LPTs) do not need to be identified as TLAAs for the LRA.

Issue 1:

The applicant stated in its response to RAI 4.1-8, Part 2 that evaluation of stress corrosion cracking (SCC) in Westinghouse Report WSTG-1-NP (i.e., Reference 3 in the RAI response) is not a TLAA because it does not involve time-limited assumptions. However, SCC is identified in GALL Table IX.F as time-dependent aging mechanism, which implies that the analysis of SCC involves a time-limited assumption, unless demonstrated to the contrary.
In contrast, the response to the RAI did not provide any reason why the analysis does not involve a time-limited assumption and therefore does not adequately demonstrate that the evaluation of SCC in the referenced Westinghouse analysis would not need to be identified as a TLAA for the LRA.

Request 1:

Explain how the analysis of SCC was performed in Westinghouse Technical Report No. WSTG-1-NP (i.e., Ref. 3 in the response to RAI 4.1-8). Based on this explanation, clarify why the analysis of SCC in the report is not considered to involve time-limited assumptions. Based on your response, provide your basis (i.e., justify) why the analysis of SCC in the referenced Westinghouse report does not need to be identified as a TLAA, when compared to the six criteria for defining an analysis as a TLAA in 10 CFR 54.3(a).

Issue 2:

The applicant stated in its response to RAI 4.1-8, Part 2 that "no fatigue-based analysis was required or used in the turbine missile evaluation." However, UFSAR Section 10.2.3 (i.e. UFSAR page 10.2-9) makes the following statement:

> Prior to 1980, the Westinghouse missile probabilities and energies analyses were directed primarily at missile generation due to destructive overspeed. Fatigue of the rotating elements due to speed cycling was also considered as a missile generation mechanism in these earlier analyses. These earlier Westinghouse analyses indicated that the probabilities of missile generation due to fatigue and destructive overspeed were very low in comparison to the probability estimated by Bush. The Bush probability (1 x 100-4 missile producing disintegrations per turbine operating year) was chosen for the original Sequoyah missile hazard evaluation in order to provide a very liberal margin of safety.

Based on this UFSAR statement, it appears that the Westinghouse fatigue analyses of the LPT rotating elements were used to confirm the missile generation probabilities of the Bush studies (as referenced in the UFSAR and response to RAI 4.1-8, Part 1) that were used for the LPTs. It is not evident why these Westinghouse analyses would not need to be identified as TLAAs for the LRA.

Request 2:

1. Identify the Westinghouse fatigue analyses that were referenced on UFSAR page 10.2-9 and performed in analysis of the LPT rotating elements.
2. Explain how the assessment of fatigue was performed in these analyses.
3. Provide your basis (i.e., justify) why the stated Westinghouse fatigue analyses of the LPT rotating elements would not need to be identified as TLAAs for the LRA, when compared to the six criteria for defining an analysis as a TLAA in 10 CFR 54.3(a).

RAI 4.1-11a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 11, 2013, the applicant provided its responses to RAI 4.1-11, which provided the applicant's basis on why the exemption for use of ASME Code Case N-514 as the basis for establishing the temperature enable settings for the low temperature overpressure protection (LTOP) system does not need to be identified as an exemption for the LRA in accordance with the requirements in 10 CFR 54.21(c)(2). In its response, the applicant stated that ASME Code Case N-514 has been incorporated into ASME Section XI, Appendix G, and therefore, this exemption will not be required when the pressure-temperature limits are updated for the ~~period of extended operation~~PEO. The applicant stated that an LRA amendment is not needed with respect to identifying this exemption as an exemption that meets the requirements in 10 CFR 54.21(c)(2).

Issue:

The staff does not find the applicant's response to RAI 4.1-11 to be acceptable because 10 CFR 54.21(c)(2) requires regulatory exemptions to be identified in the LRA based on the CLB as it exists at the time of the NRC's LRA review, and not on future actions that may or may not be implemented during the period of extended operation. The regulation requires the applicant to identify any regulatory exemption that was previously granted under the requirements of 10 CFR 50.12 and whose basis for the exemption was based on a ~~time-limited~~ aging ~~analysis~~TLAA. For each exemption that does need to be identified for the LRA, the rule requires the applicant to provide an evaluation in the LRA that justifies the continuation of the exemption during the period of extended operation.

The Pressure Temperature Limits Report (PTLR) and WCAP-15293 for Unit 1 and PTLR and WCAP-15321 for Unit 2 refer to ASME Code Case N-514 in relationship to establishing the enable temperature for the LTOP system in each unit. However, the CLB for each unit still contains an exemption to use ASME Code Case N-514 for the pressure lift setpoints and enable temperatures of the plant LTOP systems. As such, the exemption to use Code Case N-514 may be based on a TLAA since the exemption allows the applicant to establish these setpoints based on a mathematical function of the limiting adjusted reference temperature (RT_{NDT} value) for the reactor vessel beltline materials. Therefore, the staff needs further justification why the exemption for use of ASME Code Case N-514 had not been identified as an exemption that meets the exemption identification criteria in 10 CFR 54.21(c)(2) and why this exemption has

not been included in the LRA and dispositioned in accordance with the exemption requirements in 10 CFR 54.21(c)(2).
~~The current Pressure Temperature Limits Report (PTLR) for Unit 1 and PTLR for Unit 2 both list ASME Code Case N-514 as the current methodology basis in the CLB for establishing the enable temperature setpoint for the LTOP system in each unit, even though the applicant does have the option of amending its licensing basis during period of extended operation to eliminate the need for application of ASME Code Case N-514. This exemption may be an exemption that is based on a TLAA since the enable temperature is based relative to a comparison to the limiting adjusted reference temperature (RT_{NDT} value) for the reactor vessel beltline materials. Therefore, the staff needs further justification why the exemption for use of ASME Code Case N-514 had not been identified as an exemption that meets the exemption identification criteria in 10 CFR 54.21(c)(2) and why this exemption has not been included in the LRA and dispositioned in accordance with the exemption requirements in 10 CFR 54.21(c)(2).~~

Request:

1. Clarify whether the exemption for use of ASME Code Case N-514 had been granted in accordance with the requirements in 10 CFR 50.12.
2. Clarify whether the alternative bases in ASME Code Case N-514 were based on a TLAA and justify your bases for concluding that either the stated exemption is either based on a TLAA or is not based on a TLAA.
3. ~~Clarify whether the use of ASME Code Case N-514 is currently referenced in Sequoyah Report No. PTLR-1 as the basis in the CLB for establishing the LTOP system enable temperature setpoint for Unit 1 and in Sequoyah Report No. PTLR-2 as the basis in the CLB for establishing the LTOP system enable temperature setpoint for Unit 2.~~
4. 3. Based on your responses to Parts a~~., b., and c~~1 and 2~~.~~ of this RAI, justify why the exemption to use ASME Code Case N-514 for Units 1 and 2 would not need to be identified as an exemption for the LRA that meets the exemption identification requirements in 10 CFR 54.21(c)(2).

RAI 4.6-1 - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

Per SRP-LR Section 4.6.1.1.1 for a TLAA to be dispositioned in accordance with 10 CFR 54.21(c)(1)(i), the existing analyses must be verified to be valid and bounding for the period of extended operation. SRP-LR Section 4.6.3.1.1 states that the existing analyses should be shown to be bounding even during the ~~period of extended operation~~PEO.

LRA section 4.6 states "Analyses were identified for bellows assemblies for the penetrations that stated they were qualified for 7000 cycles of the design displacements. The number of design displacements expected to occur from either thermal changes or containment pressurizations is much less than 7000. Therefore, the associated penetrations bellows are qualified for the PEO. The analysis remains valid for the PEO in accordance with 10 CFR 54.21(c)(1)(i)."

Issues:

The staff reviewed the SQN UFSAR and was not able to find and verify the analyses used to estimate the number of displacements for bellows assemblies of the penetrations expected to occur from thermal changes or containment pressurizations and project those analyses to the end of the PEO.

Requests:

To ensure "the estimated number of cycles" are within "the qualifying limit of 7000 cycles," describe how the qualifying limit of 7000 cycles was determined, and provide the estimated number of cycles due to cyclic loading conditions (e.g., thermal, pressure, etc.) for the containment penetration bellows at the end of PEO.
~~Explain and justify how the existing analyses used in the LRA to estimate the number of displacements for bellows assemblies of the penetrations expected to occur include those for thermal changes or containment pressurizations. and provide information on the basis for stating that the analyses remain valid to the end of the PEO.~~

RAI B.1.40-1a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

Based on its audit of the applicant's program basis document for the Structures Monitoring Program, it is not clear that the preventive actions for storage, lubricants, and corrosion potential discussed in Section 2 of the ~~Research Council for Structural Connections (~~RCSC~~)~~ publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts," will be used consistent with the recommendations in the GALL Report.

Issue:

The applicant's response to RAI B.1.40-1 dated July 1, 2013 states that the Structures Monitoring Program employs the preventive actions for storage, lubricants, and corrosion potential. The program basis document stated that the preventive actions of Section 2 of Research Council for Structural Connections publication "Specification for Structural Joint Using ASTM A325 and A490 bolts" have been considered in existing plant procedures for ASTM A325 and A490 bolting. However, during its audit, the staff found that the existing procedures provided as part of the program basis document for the Structures Monitoring Program did not include the preventive actions for storage, lubricants and corrosion potential. The staff has not been provided with sufficient information to verify that the preventive actions program element of the Structures Monitoring Program is consistent with the GALL Report, without enhancement or exception, as claimed by the applicant in the LRA.

Request:

1. Describe the preventive actions for storage, lubricants, and corrosion potential employed by the Structures Monitoring Program.
2. If the procedures describing these preventive actions were not referenced~~provided~~ in the program basis document when audited, provide clarification and make revisions to the LRA and UFSAR supplement as necessary.

RAI B.1.40-4a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

Based on the response dated July 1, 2013, the technical evaluation of the groundwater in-leakage concluded that 1) the condition would not affect the intended function of the structure elements, and 2) the technical evaluation of the crack concluded that the structural capability of the turbine building north wall was not unacceptably impaired and that the wall would continue to perform its design function.
The response stated that minor groundwater in-leakage has been observed and documented in several Category I~~I~~ structures since 1996. Inspections of the turbine building (as listed in the LRA), a non-Category I structure, noted in-leakage in the basement floor slab at elevation 662.5' and significant in-leakage for the north and south perimeter walls above floor elevation 662.5' and floor elevation 685'. The response also stated that the turbine building is the most significant of the structures within the scope of the Structures Monitoring Program due to the constant moisture in-leakage over large areas of the structure. Although leak repairs have been initiated, the staff observed conditions during the audit walkdowns that may need further evaluation to demonstrate that the effects of aging will be adequately managed during the period of extended operation. The staff is concerned that the continued constant exposure to groundwater in-leakage may affect the integrity of the reinforced concrete during the period of extended operation.

Issue:

1. The technical basis, supporting the evaluation that concluded the groundwater in-leakage into the turbine building would not affect the intended function of the structure, was not provided.
2. The technical basis, supporting the evaluation that concluded the structural capacity of the turbine building north wall was not unacceptably impaired, was not provided.
3. Considering the history of constant groundwater in-leakage, in the absence of a plan to further evaluate the condition of the below-grade concrete, the staff is concerned that the periodic visual inspections, performed under the proposed Structures Monitoring Program, may not provide sufficient information, regarding the integrity of the concrete and reinforcing steel, for monitoring and trending of the structure during the period of extended operation.

Request:

1. Provide additional information regarding the technical evaluation that was performed, which concluded the groundwater in-leakage would not affect the intended function of the turbine building. Include the following details in the response:

    a. Completion d~~D~~ate ~~in~~ for which the technical evaluation ~~was performed~~ and if/when it was re-evaluated
    b. Description of activities performed (e.g. visual inspection, testing, structural analyses, chemical analyses)
    c. Description of the qualitative or quantitative acceptance criteria used
    d. Discussion of results obtained supporting the conclusion reached
    e. Corrective actions taken, if any
    f. Structural drawing(s) detailing the below grade-concrete in the area considered to have the most significant in-leakage, indicating floor elevations, water table elevation, concrete wall and floor slab thickness, rebar details. Indicate on the drawing the approximate locations of groundwater in-leakage.

2. Provide additional information regarding the technical evaluation of the large diagonal crack on the north wall of the turbine building, which concluded that the structural capacity of the turbine building north wall was not unacceptably impaired. Include the following details in the response:

    a. Width of the crack at its widest point
    b. History of crack growth
    c. Discussion about the source of rust colored stains on the wall and flowing out of the crack
    d. Description of activities performed (e.g. visual inspection, testing, structural analyses, chemical analyses)
    e. Discussion of results obtained supporting the conclusion reached
    f. Corrective actions taken, if any
    g. Sketch detailing the location and dimensions of the crack, and areas of spalling.

3. In the absence of a plan to mitigate the groundwater in-leakage, explain how the proposed Structures Monitoring Program will adequately manage the potential increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide; cracking due to expansion from reaction with aggregates; and cracking, loss of bond, and loss of material due to corrosion of embedded steel. Include any plans for testing and/or inspections that may demonstrate the effects of aging will be adequately managed during the period of extended operation.

RAI 3.1.2-4-1a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

By letter dated July 29, 2013, the applicant responded to RAI 3.1.2-4-1, and stated that reduction of heat transfer is not an aging effect requiring management for steam generator tubes.

Issue:

The staff considers reduction of heat transfer in steam generator tubes to be an applicable aging effect requiring management. The staff notes that heat transfer is the intended function for the steam generator tubes, and without proper management, the intended function could be compromised ~~"EPRI Steam Generator Integrity Assessment Guidelines" provides guidance on maintenance for steam generator components, including secondary side cleaning. Section 10.4 of the EPRI guidelines describes the guidance on preventing "heat transfer limitation," to manage reduction of heat transfer for steam generator tubes. The applicant's Steam Generator Integrity Program, in part, includes secondary side maintenance activities, such as sludge lancing, for removing deposits that may contribute to aging-related degradation. The applicant's program should implement the EPRI guidelines in accordance with NEI 97-06, consistent with the GALL Report.~~

Request:

Discuss how reduction of heat transfer will be managed for steam generator tubes. Revise the LRA as necessary, consistent with the response.

RAI B.1.25-1a (Follow-up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

In a letter dated May 31, 2013 the staff issued RAI B.1.25-1 requesting additional information ~~that demonstrates~~ on the corrective~~proactive~~ actions taken to prevent in-scope inaccessible power cable exposure to significant moisture including- manhole, sump pump, and cable support structure inspection and, maintenance~~, and corrective actions~~. The staff also requested the applicant to include a summary discussion of the complete schedule for inaccessible cable corrective actions ~~and their schedule for completion~~. The staff further requested the applicant describe inaccessible power cable testing (e.g., test frequency, and ~~test~~ applicable~~ility~~ tests) performed that demonstrates that in-scope inaccessible power cables will continue to perform their intended function consistent with the current licensing basis (CLB)~~before and during the period of extended operation (PEO)~~.

In response to the staff's RAI, in a letter dated July 1, 2013, the applicant stated that as documented in the SQN corrective action program, there have been multiple instances of water in manholes at SQN. In 2012, a report was initiated in the correction action program to document the trend of high levels of water in manholes that the work control process is not resolving in a timely manner. In response to the identified issues with untimely removal of water from manholes, the preventive maintenance (PM) task instructions were revised to require water removal, if found, from the manholes before the PM task could be closed.

SQN experience since revising the PM instruction has been that the water, if any, has been removed within a week of initiating the PM activity. The applicant also stated that as a result of operating experience (OE) with water in the manholes, a team of TVA personnel was established in early 2013 to resolve the dewatering issues with safety-related manholes. The team is scheduling activities which will repair or replace sump pumps and discharge piping as necessary to improve dewatering performance. In addition, TVA stated it is issuing a modification to enhance the ability to remove water from manholes without having to remove the heavy missile shield manhole covers. The applicant further stated that a cable support structure inspection is performed at least once every five years as part of the SQN structures monitoring~~surveillance maintenance~~ program (SMP). Finally, the applicant stated ~~and~~ that the inspections described in NUREG-1801, Section XI.E3 will be implemented as part of the new SQN Non-EQ Inaccessible Power Cables (400 V to 35 kV) Program described in LRA Section B.1.25 prior to entering the PEO. During the PEO, the periodic inspections of manholes including cable support structures will be completed at least once every year (annually).

Issue:

The applicant's~~PM~~ program for inaccessible cables may allow unacceptable water levels to remain in the manhole for an extended period~~up to a week~~ before corrective action to remove the water is completed. The staff noted that because of the difficulty in removal of the ~~heavy~~ manhole covers, there ~~was~~ has been limited manhole inspection and ~~preventive~~ maintenance of the sump pumps to ensure sump pumps were operable and capable of preventing cable submergence. In addition, based on OE with water in manholes, the staff is concerned that the current five year inspection frequency for manhole structures including cable supports may not be adequate.
The applicant's RAI response did not ~~provide~~ describe~~what~~ the corrective actions to be ~~that will be~~ taken ~~to ensure~~for manhole inspection and maintenance ~~the operation~~ of sump pumps to prevent exposure of cables to significant moisture~~unacceptable water levels~~. The staff is concerned that the applicant's manhole inspections and corrective actions may not be adequate to prevent in-scope inaccessible power cables fro~~or~~m being subjected to significant moisture. The staff could not determine based on current OE if the applicant's non-EQ Inaccessible Power Cable aging management program will ensure that in-scope inaccessible power cables will continue to perform their intended function ~~be effective~~ during the period of ext~~ended~~ ~~operation~~PEO.

Request:

~~1. Describe how the inspection frequency for water collection and manhole support structures are established and adjusted for plant specific and industry operating experience.~~

1. Describe ~~what~~corrective -actions (e.g., inspection, preventive maintenance) and inspections ~~including frequency, that~~ have ~~will~~ been taken to ensure the operation of sump pumps to prevent exposure of in-scope inaccessible power cables to significant

moisture~~unacceptable water level~~~~significant moisture~~. Include a discussion of the completion schedule to implement the corrective actions.

~~2.~~ Provide a technical justification for the current 5 year inspection frequency for in-scope manhole cable support structures given plant specific OE with water in the manholes and GALL Report AMP XI.E3 guidance. Include a discussion on how the interval for water collection and inspection of manhole structures including cable supports is established and adjusted for plant specific and industry operating experience.

2.

~~3. Describe preventive maintenance activities that have been taken or will be taken to ensure that sump pumps are operable to prevent cable submergence.~~

4. ~~Provide a technical justification for the current five year inspection frequency interval~~ ~~for in-scope manholes and cable support structures given the plant- specific OE with water in the manholes.~~

3. For in-scope inaccessible power cables subjected to submergence (significant moisture), how is the condition and operability of these cables determined? Describe the tests and inspections performed as part of the corrective action to ensure that these cables remain capable of performing their intended function consistent with the current licensing basis~~during the PEO~~.

~~XI.E3 The purpose of the aging management program (AMP) described herein is to provide reasonable assurance that the intended functions of inaccessible or underground power cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are exposed to wetting or submergence are maintained consistent with the current licensing basis through the period of extended operation.~~

RAI B.1.17-1a (Follow up) - changes were made as marked up below, and a mutual understanding was reached by the staff and the applicant.

Background:

In its response of RAI B.1.17-1 on July 1, 2013, the applicant stated "The configuration of the strainer allows leak off water to flow down the strainer and onto the ERCW strainer support causing corrosion. Planned corrective actions include a design modification of the strainer to prevent ERCW support from being continuously exposed to water, thus mitigating corrosion. The modification proposed to install a "catch container" to the ERCW strainer to route the leak off water coming out of the top of the strainer to a floor drain." The LRA states "The program was developed in accordance with ASME Section XI, 2001 Edition through the 2003 Addenda as approved by 10 CFR 50.55a." Accordingly the ERCW strainer support components should satisfy the requirements Article IWF-3000, "Standards for Examination Evaluations," which may include examinations, corrective measures, evaluations, tests, etc., currently and during the period of extended operation. GALL Report AMP XI.S3, in program element "acceptance criteria," refers to the acceptance standards of IWF-3400, and states "other unacceptable conditions include [l]oss of material due to corrosion or wear, which reduces the load bearing capacity of the component support."

Issue:In summary, the applicant will be implementing a corrective action of redirecting the leaking water on the ERCW strainer support components to a floor drain, thus mitigating corrosion. It is not clear how the corrosion process will be mitigated by restricting the leaking water on the ERCW strainer support components only, and is expected to perform its intended function during the period of extended operation.

Changing the degrading environment to a benign environment may not alleviate the initiated corrosion process of carbon steel supports subject to stresses under operating conditions. The incubation-stage of corrosion process may have already been completed on some of the support components. Material-weakening stage (cracking) of the carbon steel supports and their components and attachment welds may already have been initiated with an eventual outcome of a reduced load bearing capacity of the component support. It is not clear whether the LRA AMP In-service Inspection – IWF (ISI-IWF) Program will follow the recommendation of the GALL Report AMP XI.S3, program element "acceptance criteria," which is based on the requirements of ASME Code Section XI, Article IWF-3400 during the period of extended operation.

Request:

Provide ~~what are~~ the results of the~~the acceptance criteria for service~~ evaluations of the ERCW strainer support components per the requirements of ASME Code Section XI, Article IWF-3000"Standards for Examination Evaluations."

RAI B.1.11-1a (Follow up) – the following RAI was added to the set and mutually agreed upon.

Background:

In its July 1, 2013, response to request for additional information (RAI) B.1.11-1, the applicant provided its clarification on whether specific transients listed in RAI B.1.1.11-1 will be monitored as part of the Fatigue Monitoring program. The applicant stated the cycle limits of (1) 2,000 cycles of "Step changes in letdown stream fluid temperature from 100°F to 560°F" and (2) 24,000 cycles of "Step changes in letdown stream temperature from 400°F to 560°F" for the Chemical and Volume Control System (CVCS) regenerative heat exchangers will not be monitored by the Fatigue Monitoring program.

The applicant also stated that the 15 cycles of design tensioning cycle limit for the reactor coolant pump (RCP) hydraulic studs and nuts will not be monitored in the Fatigue Monitoring program. LRA Section 4.3.1.6 states the Fatigue Monitoring Program will manage the effects of aging due to fatigue on the RCP in accordance with 10 CFR 54.21(c)(1)(iii). The staff noted that the "parameters monitored/inspected" program element of GALL Report AMP X.M1, "Fatigue Monitoring," states that the program monitors all plant design transients that cause cyclic strains, which are significant contributors to the fatigue usage factor.

Issue:

In its justification for the two transients for the CVCS regenerative heat exchangers, the applicant stated that the letdown fluid temperature normally remains stable for both units. The applicant further stated that a maximum of 90 cycles for each of the transients are expected through the period of extended operation. The staff is unclear on the how the applicant came to these conclusions. The applicant did not explain how it determined that the letdown fluid temperature normally remains stable or how it can confirm that the temperature during the transient will remain stable for the period of extended operation. The staff is unclear if the temperature stability is during normal operation or during the transient. Also, the applicant did not provide an explanation based on its plant configuration and operational history to support its calculation that 90 cycles is expected for each transient through the period of extended operation.

In its justification, the applicant stated that the RCPs are rarely disassembled such that tensioning the studs and nuts is necessary. The applicant stated that only one RCP has installed hydraulically tensioned studs in 2005, and the studs have not been disassembled since its installation. The applicant used this basis to state that the 15 cycles of design tensioning cycle limit for the RCP hydraulic studs and nuts will not need to be monitored. However, the staff is unclear how the Fatigue Monitoring Program, in accordance with 10 CFR 54.21(c)(1)(iii), will manage the effects of aging due to fatigue on the RCPs if this transient is not monitored.

Request:

1. Confirm whether the letdown fluid temperature normally remains stable during normal operation or during the aforementioned transients.
    a. If the temperature is stable during normal operation, justify how the temperature stability has any impact on fatigue usage accumulation during the transients – in lieu of a justification, monitor these transients as part of the Fatigue Monitoring program.

    b. If the temperature is stable during these transients,
        i. State the basis for the letdown fluid normally remaining stable during these transients at SQN Units 1 and 2.
        ii. Describe what measures will be taken to ensure letdown fluid temperature will remain stable during these transients throughout the period of extended operation.

2. Describe how a maximum of 90 cycles for each of the aforementioned transients was calculated and justify that the calculations are consistent with plant configuration and operational history.

3. Describe and justify the programmatic elements of the Fatigue Monitoring Program that will manage the effects of aging due to fatigue on the RCPs, in accordance with 10 CFR 54.21(c)(1)(iii), given that the 15 cycles of design tensioning cycle limit for the RCP hydraulic studs and nuts will not be monitored.

4. If the Fatigue Monitoring Program will not be used, justify how the effects of aging due to fatigue will be managed for the RCPs in accordance with 10 CFR 54.21(c)(1)(iii). Revise the LRA as necessary.